The Potato News Bulletin

Published by

The Potato Association of America

A. G. Tolaas, President, Univ. Farm, St. Paul, Minn.
S. G. Peppin, Vice-President, Exp. Farm, Charlottetown, P. E. I.
W. Stuart, Sec'y-Treas., Dept. Agr., Washington, D. C.
W. M. Peacock, Ass't Sec'y-Treas., Dept. Agr., Washington, D. C.

VOL. I, No. 4 FEBRUARY, 1924

Suggestions

At the Cincinnati meeting a motion was proposed and unanimously adopted by the members in attendance to induce County Farm Bureau organizations to become members of The Potato Association of America. The primary object of such membership being to extend the influence of the Association through the medium of the county organization. It was suggested that this effort be largely directed at counties in which the commercial production of potatoes was an important branch of the Agricultural industry of the county. It was also felt that some of the information contained in the Potato News Bulletin could well be quoted in the Farm Bureau paper which many of these organizations publish. Uufortunately for the immediate success of such a movement no action was taken as to who should be made responsible for such a campaign. My object in raising this question at the present time is for the purpose of inviting suggestions from the members of the Association as to how we may most successfully conduct such a membership campaign. The writer feels that in counties where the Association has resident members they are the most logical person to present the proposition to the Farm Bureau Officers. Will you kindly give this matter your serious consideration and write your secretary regarding it. Another matter to which your attention is directed is that of getting your neighbor or some potato grower friend or acquaintance to join the Association. The membership application blank inserted in your copy of the News Bulletin is intended for your special use in securing a new member. We are nearing the 300 mark, won't you assist in boosting the membership to 400 before the March issue?

One more suggestion and then I am through. Don't you think the Potato News Bulletin would be more interesting if more of its members contributed news articles to its pages? If you do believe this won't you make a special effort to furnish something for the next number? Don't sit back and say "Oh let George do it." Supposing George balks, what then? None of us I believe want to see the News Bulletin discontinued; let us all do our part. — ***W. Stuart.***

POTATO NOTES

Nebraska.—On January 21 a carload of experimental and demonstrational Triumph seed potatoes was shipped from Alliance, Neb., to Baton Rouge, La. This car included 3½ bushels of every lot of potatoes certified by us the past season. Three bushels of each lot is to be distributed for demonstrational purposes throughout the state of Louisiana to the Boys and Girls Garden Clubs. The remaining half bushel is to be planted in a trial plat on the Louisiana Station Farm at Baton Rouge. The shipment also included about 70 uncertified lots, most of which had been rejected for certification and in addition 30 lots from Montana, and 15 lots from Wyoming. These are intended for planting at Baton Rouge. The car also contained 30 half bushel lots for distribution in ten counties in Oklahoma to be grown for demonstrational purposes. **—H. O. Werner.**

New York. — The writer met with the Suffolk County Potato Project Committee and attended a series of eight community meetings at various points in Suffolk County, Long Island, during the week of January 14 to 18 inclusive. The purpose of these meetings, scheduled and carried out under the auspices of the County Farm Bureau, were designed to systematize and project the potato program for 1924. It should be emphasized at this point that Suffolk County, New York, has now reached the point in potato production where it ranks close to Aroostook County, Maine, in the production of this crop. Last year Suffolk County is credited with the production of 5,000,000 bushels of potatoes, the average yield being 208 bushels per acre, second only to that of Nassau County, Long Island. The greater part of this crop has already moved to market, most of it selling at not less than $1.20 per bushel, f. o. b. shipping point. It is the general feeling that price fluctuation from now until planting time will depend principally upon weather conditions, controlling carlot movement into New York from Maine and other outlying regions. The quality of the Long Island crop is exceptionally good this year as is also that from Maine and most New York points. Although little attention is given to shipment under Federal potato grades by the Long Island grower, it is the feeling of growers on the Island that in spite of this fact they are putting a product into New York market which is considerably above the minimum U. S. No. 1 Grade requirement. Grading on the north shore of the Island is almost exclusively done by the use of mechanical graders in the hands of the shippers. While on the south shore of the Island practically no graders are used but grading is accomplished directly as the crop is picked up. Growers in the latter section feel that the use of a grading machine for potatoes often dug more or less immature, simply serves to injure and skin-up the tubers. However, this may be, the crop from the south side usually returns the grower 5 cents a bushel over that obtained by the north side grower.

The Suffolk County Improvement Committee is planning to hold the usual potato tour at the usual time next summer. It is on the occasion of these tours that growers from not only New York but from most of the leading potato states and provinces meet annually to promote acquaintanceship, to discuss mutual potato problems and to observe the principal potato demonstrations being carried on in this county.

Three large seed source demonstrations are to be laid out at different points in the county. Only those strains of seed which have been shipped to the Island in carlots for the 1924 planting will be used in these demonstrations. This plan makes it possible for all growers on the Island to compare with a minimum of effort the relative merits of the various strains of seed now in use. Probably no other potato producing area in this country is making the effort to procure the best Green Mountain and Cobbler seed available that is being made annually by the Suffolk County grower. A census at each of the eight community potato meetings during the week revealed the fact that in practically no case is a grower relying on one strain of seed for his own crop. He takes the precaution to plant from two to six strains of seed annually. The principal regions from which Suffolk County is now procuring its seed potatoes about in the order named are: Prince Edward Island, New York, Wisconsin, Maine, Vermont, New Brunswick, North Dakota, Minnesota, New Jersey and Virginia. Some second crop Cobblers are being obtained from the last two regions.

Because of the recently apparent increase in the scab control problem, these growers are actively concerned in the use of scab control measures. Although the use of inoculated sulphur as applied to the soil for the elimination of potato scab is still in the experimental stage, both the results of Farm Bureau demonstrations and the experiences of growers indicate that this method of control is very effective. The one difficulty involved in this method of control consists in the bad effects on the yield of crops which follow potatoes on soils which have received the heavier applications of sulphur. In view of the particularly sensitive reaction of cauliflower to the acid soil condition produced by sulphur, this crop has in some instances suffered considerable damage. Potato growers who are also growing cauliflower have found that these two crops cannot well succeed each other on sulphured soil. The College of Agriculture and the County Farm Bureau are now recommending that sulphur be used in relatively small amounts on only those areas in the field where scabbiness is severe in order that the bad effects from an excess application of sulphur may be avoided. The application of more than 600 pounds inoculated sulphur per acre at any one time has proven undesirable even under severe scab conditions. In case of the larger applications broadcasting the sulphur on the newly plowed land in order that it may be thoroughly incorporated in the soil by harrowing, is recommended. Smaller applications may be applied by mixing with the commercial fertilizer and so distributing it at the time of plant-

ing. Green manure, mainly through the use of rye as a cover crop, is increasing among these growers who commonly use the same soil for potatoes year after year. Although it is felt that the resulting increased acidity from this practice is of some value in scab control, it does not offer a ready solution of the problem to the grower whose soil is especially scabby. As a result of the tendency of ammoniated sulphate to increase soil acidity in contrast with the influence from nitrate of soda, the increased use of the former source of ammonia in mixed fertilizer is being recommended.

Seed treatment is practically not at all used on Long Island, very few growers expressing any interest in this method of tuber disease control. These growers feel that the more efficient method of controlling such diseases lies in the purchase of clean seed. Doubtless the principal reason for this attitude is the labor involved in the treatment of seed in such large quantities as are used on the Island.

Although practically all growers on the south side and a large percentage of those on the north, use bordeaux, relatively few have as yet become converted to the use of bordeaux dust. The principal objections to dusting are excessive cost and, in some cases, a relatively lower efficiency as compared to bordeaux spraying. It is now the feeling that the increased practice of using home mixed dust with the accompanying improvements in both dusting machines and in the dust materials, will eventually encourage dusting in this area.

Suffolk County growers are especially alert in their study and use of market news information. Many of these growers during the past season made use of the radio news service. Special effort is to be made by the farm bureau in urging the State and Federal Departments of Agriculture to increase the radio market news service this coming year.

Based upon the present intentions of approximately 150 growers in Suffolk County, potato planting in this county next spring will be aproximately the same as that of last year. If anything a slight increase is indicated. — ***E. V. Hardenburg.***

South Dakota. — Due to the lack of interest on the part of potato growers in South Dakota in the Potato Cooperative Marketing Plan as organized in Maine, Colorado, and Idaho, and now being organized in Minnesota and North Dakota, the indications are that the marketing of potatoes in South Dakota this coming fall will not be done in an orderly manner. At the annual meeting of the South Dakota Potato Growers Association it was voted by the organization to adopt the marketing plan containing the five-year contract clause, and recommended that the Potato Exchange start operations to bring about organization. A meeting of growers and business men was called which resulted in the appointing of a state organization committee to bring about the organization of the selling of potatoes in South Dakota. A committee on finance was appointed and the chairman recently reported as fol-

lows: "There is an almost total lack of interest in the matter on the part of the potato growers. Unless growers representing a considerable acreage evidence a desire for the organization and are willing to lend assistance both in a financial as well as a personal way, others, who might be willing to assist, indicate that they do not consider that there is sufficient sentiment for such an organization to justify the necessary expenditure."— **A. W. Tompkins.**

Wisconsin. — Wisconsin farmers are centering their interest this winter on "Ten years experience with the use of pure seeds and sires." This topic will be the main theme of the Farmers Course to be held in Madison the first week in February.

The potato growing organizations of the state have been asked to take their part in this program. The growers of certified seed potatoes especially, will meet at this time to review the results of the last ten years under a plan of seed potato inspection and certification.

Special attention will be given to plans for improvement in handling and distributing seed potato stock. The Wisconsin Department of Markets is working in co-operation with the Experiment Station and the potato growing organizations of the state in perfecting a Wisconsin sales organization. It is expected that during the Farmers Course week, very important plans will be presented to the growers of the state and that definite organization work will be started in the potato producing regions of the state at that time.

There is every reason to forecast a successful year along organized lines in Wisconsin in 1924. The development of the industry through organized "potato belts" will continue.

Seed potato inspection offers one of the best opportunities to study the problem of "community development" of the industry. More foundation seed stock from improved strains is needed for this work. In 1924, it will be very interesting to watch the success with foundation strains of seed now distributed throughout the various potato growing belts of the state.

The season of 1923 completed five years co-operative work with the United States Department of Agriculture in testing out leading sources of seed stock on the Spooner Branch Station. For example, certain strains of Triumph and Green Mountain are being grown in the newer counties of upper Wisconsin. The records are available on this stock covering the above five year period. What will the results be in 1924? What percentage of mosaic for example, will show in the inspection records on certain seed that has been tested on the Spooner Branch Station during the last five years? How successful will the growers be in holding the percentage of mosaic down to a standard consistent with the standards required by the seed trade? A very close "check up" will be made in Wisconsin in 1924 along these lines. Arrangements will be made to make more complete tests of certified seed on the Spooner Branch Station in 1924 along the above mentioned lines. — ***J. G. Milward.***

NOTES ON RECENT LITERATURE

ANONYMOUS. — Potato Empire Bureau active. — ***Maine Farmer, Jan. 5, 1924.*** A thirty-one meeting campaign devoted to a discussion of better potato practices is being conducted in Aroostook County, Maine. These meetings begin January 15 and extend to February 25. The conduct of these meetings is in the hands of the Extension Service of the College of Agriculture and the Aroostook County Farm Bureau. The purpose of the meetings is to bring all the farmers of the community together to discuss the best solution of their particular problems. Slides and motion pictures will be used by the speakers in illustrating potato diseases and cultural practices. — **W. Stuart.**

ANONYMOUS. — Certified immune potato varieties. — ***The Fruit-Grower* 56: *1042, Dec. 20, 1923.*** The Board of Agriculture for Scotland announce that certificates have been issued in regard to varieties found by inspection in 1923 to be immune to wart, true to type, and of 99.5 per cent purity. A complete register of names and addresses of growers receiving these certificates is soon to be published by the Board. Copies of the register are to be sold at the nominal price of 2 shillings. — **W. Stuart.**

ANONYMOUS. — Northern Ireland potato crop. — ***The Fruit-Grower* 56: *1009, Dec. 13, 1923.*** The estimated yield of potatoes in northern Ireland this season is given as 33,063,520 bushels or an average of 210.5 bushels per acre. The 1922 crop showed a total yield of 46,730,469 bushels, an average of 277.2 bushels per acre. The 10 year average yield 1913 to 1922 inclusive, was 38,520,384 bushels with an average yield of 224.7 bushels per acre. — **W. Stuart.**

ANONYMOUS. — Hiruco Seeds. — ***Hickox-Rumsey Co., Inc., Batavia, N. Y., Dec., 1923.*** This circular gives an account of the care taken in the seed potato development work of the Hickox-Rumsey Co., Inc. It relates how the different strains of a few varieties of potatoes are selected by their specialist in plant pathology and plant breeding. The tuber index method is fully described from the time the test is started in the greenhouse through two years of pure line selection work in the field. This publication also sates that the potatoes are treated with corrosive sublimate. A brief account of growing potatoes under contract is given. — **W. M. Peacock.**

ANONYMOUS. — Idaho farmers diversifying crops. — ***Crops and Markets, U. S. Dept. Agr.*, 1: *55, Jan. 26, 1924.*** According to the author of this article the potato acreage in Idaho more than doubled between 1918 and 1922 or from 34,000 to 81,000 acres. In 1923 it dropped to 67,000 acres and the probability is strongly in favor of a still further drop in 1924 as the farmers are now giving serious consideration to the problems of producing a crop that will return a profit. In the Twin Falls district where approximately 30 per cent of the potato crop has been produced many growers grew a profitable crop of beans in 1923. In the Idaho Falls sec-

tion where approximately half the potato crop of the State is grown the growers produced a very profitable crop of Russet Burbanks last season and there is little likelihood of an appreciable decrease in acreage. A smaller acreage of early potatoes is likely to be planted in the Caldwell district this coming season. Idaho potato shipments passed the 8,600-car mark on January 19, and it is estimated that there are about 4,500 cars left to ship. Last season's shipments totalled 16,213 cars. — **W. Stuart.**

ANONYMOUS. — Potato situation in Maine. — *Crops and Markets, U. S. Dept. Agr.*, 1: *55, Jan. 26, 1924.* A sharp rise in price featured the Maine potato deal during the three weeks prior to January 10. Speculation is believed to have played an important part in the Maine market, some f. o. b. sales being reported at same price as that paid by jobbers in Boston. Shipments have continued heavy. It is estimated that the Maine carlot movement will have to average 100 cars per day in order to market the crop prior to June 1. The total shipments to Jan. 19 were 18,457 cars as against 11,953 for the corresponding period last year. Very little warehouse stock has as yet been moved by dealers. Seed shipments have been comparatively heavy for several weeks. Florida seed stock is mostly shipped. Texas and the Carolinas have lately been receiving the bulk of the shipments. Certified seed was practically all sold early in the season. Uncertified seed is reported to be a drug on the market. — **W. Stuart.**

ANONYMOUS. — California seed-potato certification, 1923. — *Crops and Markets U. S. Dep't. Agr.* 1: *13, Jan. 5, 1924.* The 1923 California crop of certified seed potatoes is estimated at 130,000 bushels. Only four varieties were certified, viz: White Rose 60,000 bushels, Wisconsin Pride 60,000 bushels, Netted Gems 4,000 bushels, British Queen 6,000 bushels. A surplus of 20,000 bushels of White Rose is reported to be available for shipment outside of the state. — **W. Stuart.**

ANONYMOUS. — Nebraska seed potatoes. — *Crops and Markets. U. S. Dep't Agr.*, 1: *38, Jan. 19, 1924.* According to reports 50,000 bushels of Nebraska Triumph seed potatoes were sold during November and December. The most of the stock was shipped during these months. Louisiana growers were the heaviest purchasers. Alabama, Mississippi and Florida buyers took a part of the supply. Alliance was the heaviest shipping point, with Marsland second and Hemingford, Bushnell, Kimball, Harrison, Hay Springs, Berea, Glen and Crawford in the order named. Prices varied from $1.20 to $3.00 per cwt. — **W. Stuart.**

"CRUSOE". — Notes from the Isles of Scilly. — Early potatoes marketed. — *Fruit, Flower and Vegetable Trades' Jour.* **44**: *693, Dec. 15, 1923.* Last week a consignment of early potatoes was sent to and sold in Covent Garden Market. The potatoes were grown on the island of St. Martins which is regarded as one of the best of the whole archipelago. The author of the article sees no reason why potatoes may not be grown on the Isle of Scilly at any season of the year. In fact it is claimed that one can any

day of the year harvest new potatoes from volunteer plants. — **W. Stuart.**

DONALD FOLSOM. — **Mutations of the potato.** — *Jour. Heredity,* **14**: *45-48, April, 1923.* Five leaf-form mutations were found in over 350,000 plants examined. Descriptions are given of two of these, which were found in the Green Mountain variety, one with simple leaves, the other with thick, glabrous leaflets. The instability of these forms is indicated by their partial recovery to the normal type in succeeding vegetative generations. — **C. F. Clark.**

F. C. GAYLORD. — **Potatoes early and late, return profits in Indiana.** — *The Farmer's Guide,* **88**: *29, 44, Jan. 12, 1924.* According to the author a number of Indiana growers are realizing substantial profits from their potato crop. In support of this statement the following examples are cited. William C. Meyers, of Indianapolis, grows early potatoes for market each year. Mr. Meyers' average production per acre is around 150 bushels per acre for which it is claimed he receives from $4.00 to $6.00 a barrel. Over 100 boys in southern Indiana in connection with the Baltimore and Ohio Railroad Potato Club grew 150 bushels per acre or over last season for which they received an average price of $1.50 per bushel. Of the many essentials necessary to the production of a good crop the author places good seed first. Last year certified Early Ohio seed potatoes gave double the yield of common seed stock. A Spencer county farmer grew 475 bushels of potatoes on 1¼ acres from certified seed, while a Stark county grower made an average increase of 30 bushels per acre from certified seed. The author recommends Early Ohio for the heavier soils and suggests that on lighter soils the Irish Cobbler does very well. Suitable soil, well enriched and thoroughly prepared is necessary to the production of large crops. A liberal use of seed is also recommended, at least 15 bushels per acre. In the case of late potatoes (Rurals) it is possible to secure larger yields and 300 bushels per acre is sometimes secured. — **W. Stuart.**

ANONYMOUS. — **Cabbage and potato growers unite in big co-operative marketing campaign.** — *The Cabbage and Potato Co-operator* **1**: *No. 1, Jan., 1924.* The new organ entitled "The Cabbage and Potato Co-operator" in its initial number publishes a detailed account of the campaign happenings to date in organizing the cabbage and potato growers of Western New York into a co-operative marketing association based on the Sapiro plan of a five-year growers contract and the signing up of at least 50 per cent of the commercial acreage. — **W. Stuart.**

ANONYMOUS. — *The New York Packer, 22, Jan. 5, 1924.* Steps are being taken to organize a New York Potato and Cabbage Growers Association. This is an outgrowth of the Empire State Potato Growers Co-operative Association. Under the plan 22 counties will be organized with the necessity of signing up growers representative of 10,957 acres of cabbage and 59,862 acres of potatoes, upon the minimum control basis of 50 per cent of the commercial acreages of these commodities in the up-state districts.

Linked with the plan are warehouses and loading places throughout the territory. County units will be organized. These will be federated with the state organization. The officers of the new association are: President, K. C. Livermore, Honeoye Falls; secretary, E. P. Smith, Sherburne; treasurer, Henry Burden, Cazenovia. — **W. M. Peacock.**

W. S. BAIRD. — Potatoes. — ***Canada Expt. Farms, Nappan (N. S.) Sta. Rpt. Supt. 1922, pp. 37-39.*** In a 6-year variety test Davies Warrior, Britist Queen, Arran Chief and Factor, all of British origin, proved very resistant to late blight, leaf-roll, mosaic, and other diseases, and also outyielded all others. Arran Chief is considered best suited for the heavy soil on the farm. In a test of certified vs. uncertified seed potatoes of Green Mountain and Irish Cobler. Certified Green Mountain showed an increase in yield of 60.6 per cent over uncertified and the Irish Cobbler of nearly 19 per cent. In the row spacing experiment in which the sets were planted in all cases 12 inches apart, rows two feet apart, yielded at the rate of 418.5 bushels per acre, 238.3 at 30 inches apart, 225 at three feet and 169.7 bushels at 3.5 feet apart. The cost of growing an acre of potatoes as per itemized account submitted totalled $98.96, deducting a credit of $9.60 for 64 bushels of small potatoes at 15c per bushel leaves a total cost of $89.36 to be charged against 253 bushels of marketable potatoes or a production cost of 35.3 cents per bushel. — **W. Stuart.**

W. SAXBY BLAIR. — Potatoes. — ***Canada Expt. Farms, Kentville, (N. S.) Sta. Rpt. Supt. 1922, pp. 46-51.*** Three lines of investigation are reported for the year 1922, viz: Test of varieties seed cut in different ways and potato scab control. Ninety-six lots were included in the variety test. No attempt is made by the author to summarize the results of the test other than to present data on yield in a tabular form. The data on different ways of cutting potatoes for planting is rather interesting. The size of seed used was as follows: One-eye, small piece; one-eye, large piece; two-eyes, small piece; two-eyes, large piece; three-eyes, whole, seed end, stem end, lengthwise, ordinary. Three varieties were used, — Green Mountain, Manistee, and Davies Warrior. The data presented does not show any correlation in the behavior of the same sized seed pieces from the three varieties. For example in the Green Mountain the one-eye large piece gave the largest yield of marketable tubers, whereas the whole seed and two-eyes small piece sets gave the highest yields from the Manistee variety, and the two-eyes small piece of the Davies Warrior variety. As no summary of results are given it may be assumed the author does not consider one season's data sufficient to justify comment. In the potato scab control work common sulphur, bacterized sulphur, and gypsum were applied to the soil. The experiment was conducted on soil that in certain areas had been heavily limed with 7,500 pounds of limestone in 1916, in other areas with this amount in 1916 and again in 1918, and on other areas that had not received lime. One-fortieth acre plots were used.

Bacterized sulphur was applied at the rate of 400 and 800 lbs. per acre on some of the twice limed plots. Common superfine dusting sulphur at the rate of 400 to 800 lbs. on plots limed in 1916 and on unlimed plots at the rate of 800 lbs. per acre only. Gypsum was used at the rate of 800 lbs. per acre on the three areas. According to the data presented from the area limed in 1916 the plot treated with 800 lbs. common sulphur showed the least scab. On the area limed in 1916 and 1918 there is no evidence from the data presented that any of the applications were beneficial. The unlimed area did not develop sufficient scab on the untreated or check plots to justify any conclusion.— **W. Stuart.**

R. H. HELMER. — Potatoes. — ***Canada Expt. Farms, Summerland (B. C.) Sta. Rpt. Supt. 1922, pp. 56 to 61.*** The author prefaces his report on potatoes by the statement that potatoes grown in the hot, interior, irrigated sections in British Columbia deteriorate very quickly in vigor of plant and yield of tubers. In order to further corroborate this statement variety tests were undertaken with seed from different localities as well as with home grown seed. Home grown seed as was expected proved quite inferior to freshly imported northern seed. Tests with certified seed gave very high yields. Comparison of mature vs. immature seed. Maturity of seed was obtained by planting for mature seed on May 10 and on June 27 for immature seed. The results secured in 1923 were in favor of mature seed. — **W. Stuart.**

W. H. HICKS. — Potatoes. — ***Canada Expt. Farms, Agassiz (B. C.) Sta. Rpt. Supt. 1922, pp. 22-24.*** In a commercial fertilizer test on early varieties a mixture of nitrate of soda and superphosphate of lime gave more than fifty per cent better yield than superphosphate of lime alone even though the superphophate of lime plot yielded almost fifty per cent more than the check plot. In the variety test Dreer's Standard proved to be the leading potato in point of yield in 1922 while Early St. George was a close second. In the Soil Insecticide test the application of 300 lbs. of the preparation per acre gave 17 per cent over the checks. A study of time of application of nitrate of soda showed that it was immaterial to a late crop whether it was applied at the time of planting or when the plants were just through the ground. The use of superphosphate of lime at the rate of 600 pounds per acre increased the yield 47 per cent at a cost of $11.10 per acre. — **W. Stuart.**

G. A. LANGELIER. — Variety and strain test of potatoes. — ***Canada Expt. Farms, Cap Rouge (Que.) Sta. Rpt. Supt. 1922, pp. 57-59.*** of the 67 varieties and strains tested during 12 years, only 7 are regarded by the author as worthy of further test. The Dooley variety, (presumably belonging to the Up-to-Date group. [W. S.]), has shown itself to be superior to Green Mountain for the two years 1921 and 1922 but will not be recommended to replace the Green Mountain until it has demonstrated its superiority for another three years. The author recommends all potato growers in his section to grow only one or two varieties. The Irish

Cobbler is recommended for early use and Green Mountain for the general crop. The improvement of the Green Mountain potato by selection has received considerable attention since 1915. Of the hundreds of selections made only five have been retained since 1920. The three-year (1920-1922) average production of these five strains in bushels per acre are 676.1, 594.9, 594.7, 573.9 and 540.4 bushels respectively. One of these strains is said to be quite disease-resistant. — **W. Stuart.**

W. R. LESLIE. — Potatoes. —*Canada Expt. Farms, Morden (Manitoba) Sta. Rpt. Supt. 1922, pp. 46-50.* — The chief experiments reported are size and character of seed piece, spacing of sets in row, depth of planting, and seed treatment. On account of extremely low yields due to an unfavorable growing season the data obtained lack conclusiveness. Ten-inch spacing seemed to be the best distance for Early Ohio and Irish Cobbler. Seed treatment did not reduce the per cent of rhizoctonia infected tubers. The author, however, feels that the failure was not due to ineffectiveness of the corrosive sublimate treatment but rather to soil infection. — **W. Stuart.**

B. F. LUTMAN. — Further observations on the osmotic pressure of the juices of the potato plant. —*Jour. Agr. Res.* 24: *243-256, Nov. 10, 1923.* This is a report of further observations to those previously reported in ***Am. Journ. Bot.* 6: *181-202, 1919,*** in which the literature on the subject was discussed in connection with the data given: The author states that these studies were bgun during the summer of 1918 and were continued through 1919, 1920, and 1922, and greenhouse readings taken in 1921. The 1918 studies were primarily for the purpose of ascertaining whether the internal osmotic pressures of the juices from different parts of the potato plant varied in such a way as to be a possible factor in the production of tipburn. It was found that during the early part of the growing season the juice of the growing leaves had a higher osmotic pressure than in other portions of the plant, and that during the time the flowers and tubers were being produced or during the height of the plants' activity the stem juices showed a higher pressure. This statement is followed by the remark that it is at this time that the physiological type of tipburn occurs. In the cryoscopic (freezing point of the juices) determinations the author was assisted by Mr. R. L. Gale. The varieties of potatoes used in the experiment were Irish Cobbler, Early Rose, Burbank, Green Mountain, Russet Rural (Dibble Russet), McCormick and White McCormick. Dahlia, artichoke and lettuce plants were also studied. The osmotic pressure of the juices from all parts of the potato plant was determined in these studies. No material variation was noted in the juices from the stem or seed end of the tubers. Plants grown under shade showed a lower osmotic pressure than those in full light. The juice from leaves of mosaic plants showed a lower pressure, but the stems showed exactly the reverse, on August 18 and 28. Checking growth of young terminal leaves tends to lower the osmotic pressure of their juices below that of

older leaves. No differences could be detected in the juices from the early and late varieties. A wet year lowers the pressure, while a dry one raises it, especially in the new tubers. Potato plants grown in the greenhouse never developed a superior osmotic pressure in the stems; the pressure in the leaves was always much higher. The osmotic pressure in the new tubers developed in the greenhouse was about the same as field-grown plants. This was thought to be due to the rather dry condition of the soil.—**W. Stuart.**

H. H. MANN; S. D. NAGPURKAR; G. S. KULKARNI; R. S. KASARGODE; S. R. PARANJUPE; AND B. M. JOSHI.—**Investigations on potato cultivation in Western India.** — *Dep't. Agr. Bombay Bul. 102, pp. 1-145, (1920) published 1921.* The bulletin is divided into twelve parts as follows: 1. Potatoes in the Khed taluka of the Poona District. 2. The Mahableshwar area of the Satara District. 3. Potato cultivation near Belgaum and Dharwar. 4. Causes of low yields of potatoes generally. 5. The potato moth. 6. The ring disease of potato. 7. Other diseases found in the seed, (a) dry rot, (b) rhizoctonia, (c) powdery scab, (d) eelworm. 8. Field diseases of potatoes leading to loss of crop: (a) The tambera disease (b) the stem borer. 9. The storage of potatoes: (a) black heart or heat rot of potatoes in storage, (b) Methods of storage of potatoes through hot weather. 10. The manuring of potatoes in Western India. 11. The varieties of potatoes grown in Western India. 12. General conclusions. While the general information contained in this bulletin is of interest to the potato student, the cultural methods are so foreign to those employed in America that they are of little value to us. The most interesting features to the writer are those pertaining to the crops grown, source of seed, spacing of plants, amount of seed used, yields secured, diseases, and storage problems. S. D. Magpurkar in parts 1, 2, and 3 gives a fairly complete picture of the extent of the potato crop produced in the three areas discussed. The minimum and maximum acreages devoted to the potato in the Khed taluka of the Poona district during the past twenty-five years was 3346 and 8369 acres respectively. Italian grown seed potatoes have been found most satisfactory to use, both from yield and disease standpoint. The best growers aim to get a fresh lot of seed every three or four years. Two crops are grown in the Khed taluka:—The rabi—early or cold weather crop; and kharif, which will correspond to the second or fall crop in the South. The rabi crop is usually planted in the latter half of November, while the kharif crop is generally planted early in May or June. The rabi is the most important crop. According to Nagpurkar the rabi crop is planted in rows six inches apart with sets spaced nine inches apart in the row. The author states this spacing requires 80,000 sets per acre and consumes 1,120 pounds of seed. Figured on the basic area of an American acre a 6x9 inch spacing would require over 116,000 sets. Assuming that 80,000 sets are cut from a total of 1120 pounds of tubers the average weight of set used would be less

than one fourth of an ounce, or 0.224 of an ounce. After planting, wafas (beds) are made up, each of which include five saries (rows). The crop is irrigated on the same day as planted and is given another irrigation in 15 days, followed by a third twelve days later. When the plants come up the land is weeded and the crop earthed up or left level. Thereafter the land is irrigated about every ten days. The yield secured at Chakan varies from eight to twelve times the amount of seed used, or from 149.3 to 224 bushels per acre; while at Khed the usual yield is six to eight times the seed used, or 112 to 149.3 bushels per acre. The kharif crop is grown during the rainy season, and on that account is usually planted on higher land not capable of being irrigated. The cultural practices in the Mahableshwar area of the Satara district are somewhat different. The cultivation is almost entirely by hand. Sets for the kharif crop are planted in the sides of hills one foot high, while in the rabi season they are planted in rows. In most sections the kharif crop is grown for seed puropses, though in some localities it is grown for table use. About 900 pounds of seed are used per acre. The rows are spaced twelve inches apart and the sets spaced nine inches apart in the row. The yield secured is usually four to six times the amount of seed used, or 60 to 90 bushels per acre. In part 4, Mann states that the chief causes of low yield are first, failure of a large proportion of the seed pieces to germinate; second, the seed is generally infested with potato moth and bacterial ring disease, and thirdly, to a number of field diseases of the crop. He states that a count taken in an average field at Khed showed 45 per cent of missing plants, while at Peth a particularly good field only showed 20 per cent misses. These counts, the author states, were made toward the close of the season and of course do not accurately represent misses due to germination trouble alone. Considerable stress is laid upon the desirability of planting the seed when it is at the proper stage of germination. Some hints are given in regard to the difficulty of holding potatoes in storage at a temperature low enough to prevent injury. A temperature of 90 degrees F. is claimed to induce a rotting of the tubers. The author therefore recommends that the temperature of the storage house, cellar, or room should always be kept below 90° F. Plates 5 and 6 illustrate plants showing a typical attack of tambera disease. The tambera disease is said to be caused by a mite. It is claimed that the kharif crop grown during the rainy season is most severely affected.—**W. Stuart.**

J. A. McClary. — Potatoes. — ***Canada Expt. Farms, Lennoxville (Que.) Sta. Rpt. Supt. 1922, pp. 21-22.*** A brief report is made upon a variety test, potato spraying experiment, and a comparison of different kinds of potato sets. As in the case of the Cap Rouge Station it was found that Irish Cobbler for the early crop and Green Mountain for the late crop were found most satisfactory for the eastern townships of the province of Quebec. The best combination insecticide and fungicide spray was obtained by using 1½ lbs. of calcium arsenate to 40 gallons of Bordeaux

mixture. Two-eye sets gave a slightly larger yield than 3-eye sets. Small whole tubers or one-eye sets gave much lower yields.—**W. Stuart.**

W. C. McKILLICAN. — **Potatoes.** —*Canada Exp't. Farms, Brandon (Man.) Sta. Rpt. Supt. 1922, pp. 58-62.* **Data are given** in this report on a test of varieties, chiefly with respect to yield, date of planting; amount of cultivation, hilled vs. level cultivation; size of seed; manuring; and depth of planting. The author regards the Green Mountain group of varieties as best suited for main crop potatoes in Manitoba. Among early varieties the Early Bovel is considered about the best. Objection is raised against the Irish Cobbler on account of its deep eyes. The best date of planting appears to be the middle of May, and it is thought that the yield could be appreciably increased if Manitoba growers would plant about this date. Very little difference in yield over a five-year period was noted between hilling and level culture. Large whole seed gave the largest yield. Planting 6 in. deep gave the largest yield in 1922.— **W. Stuart.**

WM. H. MARTIN. — **Soil and seed treatment for potato scab.** — *Hints to Potato Growers. (N. J. State Potato Assn.)* **4**: *No. 8, December 1923.* The influence of soil and seed treatment in controlling the common scab on potatoes is strikingly brought out in this publication. Both treatments are effective. Satisfactory results can not be expected from treatment, of clean tubers, planted in soil badly infected with the scab organism. To produce a clean or fairly clean crop of potatoes on infected land it is necessary to take steps to eradicate the organism from the soil. According to the data presented in this article untreated seed planted in untreated soil produced 56.5 per cent clean tubers. Seed potatoes treated for one half hour in corrosive sublimate which were planted in adjoining plots produced a larger yield and 77.1 per cent clean tubers. Seed that received the same treatment and 400 pounds of sulfur applied per acre produced 95.8 per cent clean tubers as compared with 86.2 per cent clean tubers produced on land that only received the sulfur treatment. Treated seed and the application of 600 pounds of sulfur per acre produced 98.6 per cent clean tubers in comparison with the same sulfur treatment and untreated seed which gave 93.9 per cent clean tubers.—**W. M. Peacock.**

A. M. MUSSER AND C. A. LUDWIG. — **Certified seed in Irish potato production.** —*South Carolina Sta. Bul. 218 (1923), p. 16.* Results are given of comparative tests with certified and non-certified seed, conducted on different types of soil in different parts of South Carolina during the years 1922 and 1923. In all cases larger crops were obtained from the certified seed, the increases in total yield of tubers ranging from 3.6 to 23.9 barrels per acre. The increases in stand resulting from the use of certified seed varied from 5 to 32 per cent. In a single test in 1923, Virginia second crop seed produced a better stand and larger yield than Maine grown commercial seed purchased in the South. A discus-

sion is given of some of the important tuber-boren diseases.—**C. F. Clark.**

R. G. NEWTON. — **Potatoes.** — *Canada Expt. Farms, Invermore (B. C.) Sta. Rpt. Supt. 1922, pp. 15-20.* The experiments in this report are individual tuber selection, seed treatment, variety test, spacing of sets in row, size of sets, kind of set, source of seed, large whole potatoes, potato breeding, soil fumigants, effect of air slaked lime, effect of sulphur. In the individual selection experiment the tubers are exposed to the light about three weeks before planting. Only tubers showing strong, vigorous sprouts are selected. The average yield of 21 varieties for the three years (1917-1919) preceding this method of selection and the three ensuing years (1920-1922) show a remarkable increase. The yield for the former period averaged 14 tons and 645 pounds per acre, while the latter period averaged 27 tons and 620 pounds. Unfortunately, no check plots appear to have been used for purpose of comparison. In the seed vs. stem end quarter sets the former showed a distinct increase in yield. No advantage could be noted in the change of seed or source of seed experiment. Crude carbolic acid and pacolin—a substitute for creolin—were used as soil fumigants. The liquid was thoroughly mixed with sand and broadcasted by hand and worked into the soil to a depth of six inches previous to planting. The author believes that these products have had a beneficial influence in the control of scab and rhizoctonia. Agricultural sulphur was applied to the half of two half-acre plots of potatoes with the result that on one plot it seemed to stimulate growth while on the other it did not.—**W. Stuart.**

T. H. PARKS AND E. E. CLAYTON. — **Potato hopperburn (tipburn) control with Bordeau mixture.** — *Ohio Sta. Bul. 368, pp. 243-258, June 1923.* Observational studies on date of leaf hopper infestation showed that in 1920 adult leafhoppers were present in plentiful numbers in potato fields of central Ohio by June 22, while in 1921 a similar infestation occurred as early as June 9. Varietal susceptibility was also studied. Of the early varieties tested, Triumph proved most susceptible and the Irish Cobbler the least. Of the late varieties observed none were found to be immune to hopperburn injury. Members of the Green Mountain group of potatoes seemed to resist leafhopper attacks better than the members of the Rural group. A comparison of the relative effectiveness of kerosene emulsion, Bordeaux mixture carrying nicotine sulphate (one part to 500 of Bordeaux), and Bordeaux mixture alone, showed that the last mentioned was apparently the most reliable. The authors recommend the following Bordeaux mixture formula: 5 pounds copper sulphate, 7½ pounds lime to 50 gallons water. The average increase in yield due to spraying with Bordeaux mixture, from 60 field tests in 1921, was 31.6 bushels per acre. Four or five sprayings are recommended.—**W. Stuart.**

F. H. REED. — **Potatoes.** — *Canada Expt. Farms, Lacombe, (Alberta) Sta. Rpt. Supt. 1922, pp. 72-77.* The portion of the

report dealing with potatoes gives results of variety and strain tests, cultural experiments, date of planting, whole vs. cut seed, one-eye sets of different sizes, spacing of sets, or rate of planting, sets of equal size, with varying number of eyes, eyes from different parts of the tuber, 1, 2, and 4 sets per hill, freshly cut sets vs. those cut for seven days, depth of planting, hilled vs. level cultivation. The variety test included 21 lots but as the data represent but one year's test, no conclusions are attempted. Early planting proved more desirable than late planting. Unfavorable seasonal conditions so influenced the yield that it was impossible to express any definite conclusions regarding the data secured from whole or cut seed sets of equal size with varying number of eyes, sets from different parts of the tuber and one, two, and four sets per hill. Freshly cut seed did not yield as well as seed cut seven days befor planting. In the depth of planting experiment 5 inches seemed to give best results. On account of the dry season the level culture plot outyielded the hilled plot.—**W. Stuart.**

R. N. SALAMAN. — Synonymity among potatoes. — ***Fruit Grower 56; 965-966. December 1923.*** That synonymity in potatoes occurred at an early date is indicated in the Report of the Committee of the Board of Agriculture of 1795, whose examination of the collection at Ormskirk revealed that 8 out of 18 were synonyms. The first attempt to classify and study synonymity was made in 1880 by Henry de Vilmorin in a large collection maintained at Verriere, France. M. Philippe de Vilmorin published a revised catalogue in 1901 in which he indicated synonyms and possible quasi synonyms, both of which groups represented 40 per cent of 1434 varieties recorded. The first scientific attempt in England to study varieties and eliminate synonyms, was a trial of main crop and late varieties in the Royal Horticultural Societies' gardens of Wisley, where a committee of seedsmen and officials carefully examined growing plants. Beginning in 1918 this committee by invitation of John Snell, Director of the Minister's Trial Grounds at Ormskirk, assisted in similar work carried on in connection with wart resistant studies. Of the 274 new and old varieties received in 1919 for trial, 106 were synonymous. In 1920 the wart disease trials were transferred to the newly created National Institute of Agricultural Botany which established a Potato Synonym Committee with the author as chairman. A study of 210 varieties submitted as new to Ormskirk for trial in 1920 showed 70 per cent to be synonyms. Following the widespread publication of this unsatisfactory situation believed by the committee to be largely due to both the public demand for, and the desire of seedsmen to offer new named varieties. In 1922 the proportion of synonyms fell from 38 to 24 named varieties. The 1921 entries contained only 38% of synonyms. In 1922 the proportion of synonyms fell from 38 to 24%. Incomplete data for 1923 indicate a possible 20 per cent. It is believed that with the extensive publicity, that trade will become educated to the need of greater care in keeping varieties distinct. Already it has pointed out the great need for some book dealing

with the potato varieties their identification and their synonyms and an effort is being made to meet this situation.—**P. M. Lombard**

E. M. STRAIGHT. — Potatoes. —*Canada Exp't Farms, Sidney B. C.) Sta. Rpt. Supt. 1922, p. 23.* A brief report is given of a test of 34 varieties of potatoes. New lots of seed outyielded home grown seed very considerably. In a comparison of mature vs. immature seed the latter gave a much larger yield.—**W. Stuart.**

C. T. TICE. — Certified Seed Potatoes — Why they will pay. — *Province of British Columbia. Soil and Crop Circular No. 1, 1923, pp. 1-6.* Seed potato inspection and certification was started in 1921, the object being to reduce disease and keep the varieties pure. Each sack of certified seed carries the official tag of the Department of Agriculture. Leafroll and mosaic are the worst diseases existing in the Province, often reducing the yield 50 to 75 per cent. Rogueing is recommended as the only method of contracting these diseases. Only those varieties which are recommended for the Province are eligible for certification. Each district is urged to grow one or a limited number of the following varieties:—Early, Early Ohio, Early St. George; medium early, Early Rose, Irish Cobbler; late, Netted Gem, Jones' White, Eureka, Sir Walter Raleigh, Green Mountain, Burbank, Gold Coin. The use of certified seed is recommended as being far superior to other stock, although not guaranteed to be entirely free from disease.—**W. C. Edmundson.**

M. J. TINLINE. — Potatoes. —*Canada Expt. Farms, Scott (Sask.) Sta. Rpt. Supt. 1922, pp. 59-61.* The author reports on a test of varieties; hills vs. rows; kinds of sets; sprouting potatoes before planting; cutting potato sets before planting; influence of windbreaks on yields of potatoes. No comments are made regarding the variety test. The row method of culture gave the largest yield, even when same weight of seed was used. Two varieties, Wee MacGregor and Everitt, were used in kind of sets experiment. Whole tubers were compared with three-eye sets. A larger yield was obtained from whole tubers of the Wee MacGregor and a smaller yield in the case of Everitt variety. Sprouted seed gave an increase of 35 bushels per acre over unsprouted seed. Freshly cut seed gave an increase of 53 bushels per acre over that cut two weeks previous to planting. Potatoes grown inside wind-breaks gave larger yields than those in unprotected areas. Increased moisture content of soil within windbreak is thought to be the chief factor in larger yields.— **W. Stuart.**

H. O. WERNER AND R. F. HOWARD. — Seed potato investigations. *Neb. Sta. Res. Bul. 24, (1923), p. 58.* Experiments to determine the condition of western Nebraska seed stock, the influence of certain factors on seed value and the best methods of applying the results to commercial production were conducted in nine counties of Nebraska during the years 1917 to 1922, inclusive. Tuber unit studies of Triumph, Early Ohio and Pearl stocks from the western part of the state showed great differences in

vigor between the different units. Tests of the transmission of these differences in succeeding vegetative generations showed that the weak units produced only plants of low vigor which was associated with low yield. There was also a progressive degeneration of many of the strong hills. This degeneracy was of the spindling tuber type and was found to be transmitted from one generation to another through the tubers and from healthy to diseased plants in the field when grown in close proximity to one another. Comparative tests with ten varieties, continued for a period of five years, with seed grown on dry land and under irrigation, showed that dry land seed produced larger yields, a higher percentage of tubers of good type and less rapid degeneration. For the production of high grade seed it is suggested that foundation stock be secured which is practically free from degenerate types and that this be planted in an isolated plot 300 or more feet from other fields and on land which has not grown a crop of potatoes for two or three years previous as a precaution against occasional volunteer plants which may be a source of infection. Frequent inspections of the plants and the immediate removal of any which may be found to be diseased are recommended.—**C. F. Clark.**

C. M. White. — Potatoes take lead in value. —*Maine Farmer, Jan. 19, 1924.* Maine's potato crop in 1923 exceeded in money value that of any other crop. The value of the potato crop in this state is placed at $180.00 per acre, or more than double that of any crop. The aggregate value of the principal crops based on December prices was $51,853,106. The value of the potato crop alone is estimated at $22,394,500.—**Wm. Stuart.**

T. K. Wolfe. — Correlation between certain characters of the Green Mountain Irish Potato. —*Jour. Amer. Soc. Agron.*, 15: 467-470. Nov., 1923. The results of correlation studies of certain characters, including length, width, thickness, circumference, volume, and weight of tubers, numbers of eyes, number of tubers, yield of marketable and of non-marketable tubers, have shown the following relationships:

None of the tuber characters studied showed any significant correlation with yield. There was, however, a high degree of correlation between the number of tubers produced and the yield of marketable tubers.

Weight of tubers was found to be closely correlated with length, width, thickness, and circumference of the same.

In the material studied the number of eyes was found to be associated with the size of the tuber as indicated by the significant correlation between number of eyes and length, volume, and weight of tubers, respectively. This relationship did not hold with respect to width, thickness, and circumference of tubers.—**C. F. Clark.**

BOSTON'S POTATO STORY

(Continued from last issue)

As far as economy in packing is concerned, there seems to be little difference whether the stock is sacked at the shipping or receiving point.

An analysis recently made by the Division of Markets of the Massachusetts Department of Agriculture, of the charges exacted by the various middlemen, indicate that the wholesaler and the jobber operate on substantially the same gross margin, although there is a larger element of risk in the business of the wholesaler, his transactions are relatively few and of large size. The jobber, on the other hand, bears a relatively small risk, selling in large quantities, and depending on rapid turnover for his profit.

The jobber doubtless performs a more important function in the distribution of the extremely perishable fruits and vegetables than is possible in the marketing of such products as potatoes. Strawberries, peaches, asparagus and like produce require exceedingly rapid distribution, and the wholesaler is not equipped to make the many small and widely scattered sales which this necessitates. The jobber with his extensive clientele and adequate delivery equipment is able to do this efficiently. While the wholesaler might be able to perform the whole function of distributing potatoes, from the car to the retailer, it should be pointed out that since the jobber is needed for the marketing of more perishable produce, he may as well take a part in the marketing of potatoes also.

Who gets the money when the consumer buys potatoes? The retailer's margin between the purchase and sale price, is the amount the consumer pays for having a stock of potatoes near his home, for having it put in small lots, standardized, tied up in convenient packages, etc., and perhaps delivered at his door. Similarly the wholesaler's margin is the price paid him by the consumer for the functions which he performs — handling, sorting, storing and grading—for the risk of buying in large lots and selling again in small lots.

As the result of an exhaustive market survey made by the Massachusetts Division of Markets, it was learned that 48 per cent of the consumer's dollar spent for potatoes goes to the grower, 4 per cent to the country dealer or shipper, 17 per cent towards freight charges, Maine to Boston, 5 per cent to the wholesaler or carlot receiver, 5 per cent to the jobber, and 21 per cent to the retailer.— **Dorothy H. Goodwin, Mass. Dep't. Agr., Boston, Mass.**

POTATO SEED TREATING DEMONSTRTIONS IN WASHINGTON

George L. Zundel, Pullman, Wash.

The value of seed treatment, and the use of mosaic-free potatoes for seed in Washington is demonstrated in the following examples:

P. C. Shemwell of Walla Walla, in 1922 conducted a demonstration on his farm to show the value of seed treatment and the use of good seed with the following results:

Plot No. 1*	Plot No. 2*	Plot No. 3*	Plot No. 4*
Selected home-grown seed Planted June 10 Yield 175 sacks per acre.	Selected home-grown seed Planted June 20 Yield 200 sacks per acre.	Certified Seed (Washington) Planted June 30 Yield 250 sacks per acre	Cull seed Planted July 9 Yield 125 sacks per acre 35% disease

* Plots 1, 2, and 3 were treated with corrosive sublimate. Plot 4 was not treated.

Again in 1923 S. P. Maxon, of Russell Creek, Walla Walla County, used mostly good certified seed, but lacked enough to finish planting his potato patch. He used common home-grown seed to finish planting. At harvest time the following were the results:

Certified seed yielded 450 pounds per row and graded 80% U. S. No. 1 table stock.

Common seed yielded 50 pounds per row and graded 10% U. S. No. 1 table stock.

The rows in each case were of equal length.

A third case was on the farm of Bernard Kempe on Five Mile Prairie, Spokane County, where Irish Cobbler seed was used. Half of this stock had been hill selected for nine years, but without recognizing mosaic. The other half of the field was planted with certified Irish Cobbler seed. The results were as follows:

Certified seed yielded 8870 pounds per acre. Hill selected mosaic stock yielded 3025 pounds per acre.

As a result of a seed treating demonstration in San Juan County, Mr. Wood of Friday Harbor increased his yield of potatoes 20% by seed treatment.

Last year thirty farmers in King County (near Seattle) treated potatoes for the control of scab and rhizoctonia. A survey shows that in a number of cases the yield was increased 100%. The average increase yield was 83 pushels per acre.